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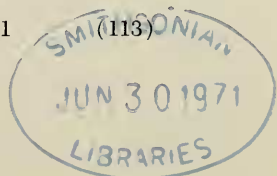
*EKKENTROPELMA BRYCHIA* N.G., N.SP.,  
AN ANTARCTIC PSOLID HOLOTHURIAN WITH  
A FUNCTIONALLY LATERAL SOLE

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In holothurians of the family Psolidae, the soft sole is ventral, occupying the greater curvature of the body, which is approximately U-shaped, with mouth and anus upturned. A fundamental plane of bilateral symmetry passes through the middle of the sole (midventral radius), the middorsal interradius, the mouth and anus, and certain internal structures, including the genital duct, and radial and interrarial pieces of the calcareous ring. A striking exception to this situation was found in a collection of holothurians from off the northwest coast of the Antarctic Peninsula. The collection includes 32 specimens of a U-shaped psolid species in which the sole is eccentrically placed, and does not occupy the greater curvature of the body. The sole is morphologically ventral as usual, but the plane of bilateral symmetry does not now include the mouth and anus. These two structures are displaced, and they lie in a plane which is at an angle of 90 degrees to the fundamental plane. Thus, the sole is functionally lateral in position, and apparently the animal is well adapted to attaching itself to vertical surfaces. The specimens represent a new genus in the Family Psolidae, and a formal description is given below.

Type material is deposited in the collections of the National Museum of Natural History, Smithsonian Institution. Support for study of Antarctic holothurians has been received from the National Science Foundation through the Office of Environmental Sciences, Smithsonian Institution.





Order Dendrochirotida Grube, 1840  
(restricted Pawson and Fell, 1965)

Family Psolidae Perrier, 1902

**Ekkentropelma** new genus

*Diagnosis:* As for the species.

*Type-species:* *E. brychia* new species (by monotypy).

*Etymology:* The generic name is of neuter gender, derived from Greek *ekkentros*, eccentric, and *pelma*, sole of the foot.

**Ekkentropelma brychia** new species

(Figures 1-3)

*Diagnosis:* Body rigid, U-shaped; well-defined sole does not occupy greater curvature of body. Mouth and anus lie in plane perpendicular to usual plane of bilateral symmetry. Calcareous deposits of sole buttons only, no cups.

*Description:* Total length of body 8.5-18.5 mm. Body more or less U-shaped, mouth and anus upturned. Body wall firm to touch owing to

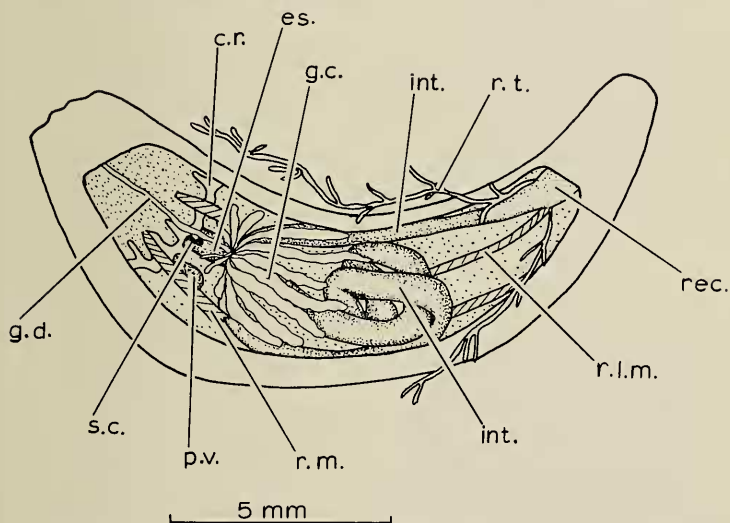


FIG. 2. *Ekkentropelma brychia* n.g., n.sp., dissected from dorsal side (partly diagrammatic). Abbreviations: c.r., calcareous ring; es., esophagus; g.c., genital caecum; g.d., genital duct; int., intestine; p.v., polian vesicle; rec., rectum; r.l.m., radial longitudinal muscle; r.m., retractor muscle; r.t., respiratory tree; s.c., stone canal.

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FIG. 1. *Ekkentropelma brychia* n.g., n.sp. Upper, holotype (total length 17 mm) ventral aspect. Middle, holotype, dorsal aspect. Lower, paratype (total length 13 mm), ventral aspect.

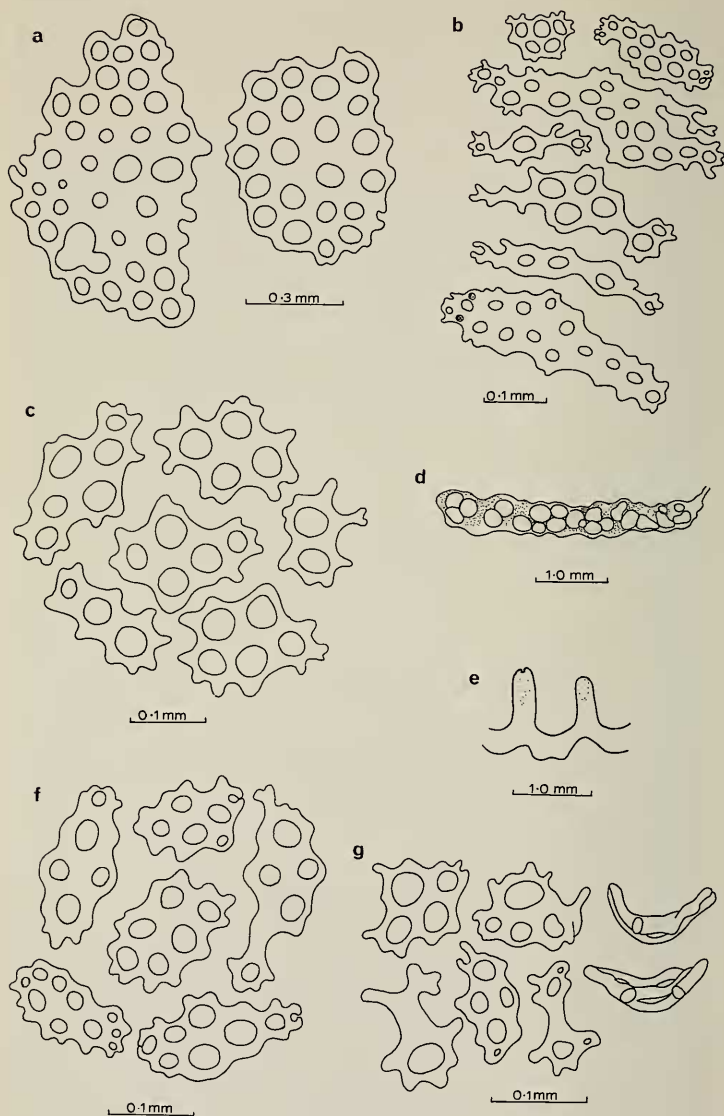


FIG. 3. *Ekkentropelma brychia* n.g., n.sp. a, plates from body wall; b, tentacle deposits; c, buttons from sole; d, genital caecum with large eggs; e, radial and interradial pieces of calcareous ring; f, tube foot deposits; g, cups from dorsal body wall.

investment of plates which form a test. Oral (anterior) end considerably thicker than anal (posterior) end. All specimens with well-developed soft sole surrounded by conspicuous suctorial tube feet. Dissection shows that while sole does not occupy greater curvature of body it is indeed ventral in position; center of sole occupied by midventral radius, edges of sole defined by right and left ventral radii. Mouth and anus displaced, lying in plane perpendicular to plane containing midventral radius and middorsal interradius. Fourteen specimens with sole to left of mouth-anus plane, 18 with sole to right.

Tube feet around sole large, conspicuous, with general tendency for number of feet to increase with increase in size of body (see Table 1). Midventral radius usually naked except anteriorly and posteriorly, but two specimens with feet in midventral radius. In one specimen of 10 mm total length, four feet scattered in midventral radius; in other specimen of 14 mm total length continuous row of 18 midventral feet present. Tube feet elsewhere minute, rudimentary, scattered all over body wall, passing between overlapping plates in body wall, and appearing under low magnification as small projections.

TABLE 1. Relationship between number of tube feet around sole and size of body of *Ekkentropelma brychia* n. g., n. sp.

Total length (to nearest mm)	No. feet	No. specimens
9	24	1
10	25	4
11	26	5
13	30	1
14	30	5
15	31	4
16	34	6
17	35	1
18	33 (2 with sole damaged)	4
19	38	1

Tentacles retracted in all specimens. Eight to ten subequal tentacles, sparsely branched, tending to be digitate rather than dendritic.

Calcareous ring (Fig. 3e) fragile; posterior margin undulating, with no projections. Anterior projections of radial and interrarial pieces similar, radials notched anteriorly, while interradians smoothly rounded.

Short, thin-walled esophagus gives rise to thick-walled stomach. Intestine complexly coiled in center of body (Fig. 2), expanding posteriorly to form thin-walled rectum. Two respiratory trees with few branches; left tree extends for half length of body, right tree extends past level of calcareous ring. Stone canal in dorsal mesentery, short, terminating in

irregularly shaped madreporite. Single bulbous polian vesicle. Sexes separate. Gonad a tuft of unbranched vesicles. In female, largest vesicles contain a few large yolky eggs (Fig. 3d) approximately 0.2 mm in diameter. Genital duct short, arising from gonad immediately posterior to calcareous ring.

Radial longitudinal muscles equally developed, thin, flat straps. Retractor muscles attach to radial muscles at level of anterior part of gonad. Circular muscles apparently rudimentary.

Apart from sole, body invested in test of overlapping plates (Fig. 3a) up to 1.1 mm in diameter. Plates polygonal to circular, flat, thick, with few large perforations. All consist of single layer of calcite; none carry spires. Overlying plates, sparsely scattered, are concave rudimentary cups (Fig. 3g), variable in shape and number of perforations (usually four). Edges carry short, rounded projections.

Soft sole with numerous buttons of average length 0.18 mm, with varying number of large perforations (Fig. 3c). Typical number of perforations four, but buttons with from one to six perforations extremely numerous. Tentacles with curved and flat plates of various sizes in large numbers; some plates with minute knobs (Fig. 3b). Tube feet surrounding sole with fragmented endplates; walls of feet contain small plates (Fig. 3f) with four or more perforations.

*Etymology:* The specific name is derived from Greek *brychios*, deep.

*Material examined:* Holotype, USNM Catalog No. E11384; USNS *Eltanin* Station 268, 64°01'S, 67°45'W to 64°08'S, 67°44'W; 20 October 1962, 2763–2818 meters, 10-foot Blake trawl. Nearest available hydrographic data (at depth of 2385 meters), temperature 0.30 degrees C, salinity 34.667 parts per thousand.

Paratypes, USNM Catalog No. E11385, 31 specimens, locality data as above.

*Remarks:* It is probable that fully mature specimens of this species have ten tentacles. The sparsely branched tentacles suggest affinities with the dactylochirote holothurians, but presence of a well defined test necessitates referral of the genus to the Family Psolidae. Within the Psolidae, the genus falls close to *Psolidium* Ludwig, 1886, but differs in lacking cups from the sole, and in the eccentric position of the sole. The only other psolid genus with scattered tube feet in the body wall is *Lissothuria* Verrill, 1867, which is apparently restricted to the Eastern Pacific and Caribbean. *Lissothuria* has dorsal deposits which include unique hour-glass-shaped deposits and/or towers (Pawson, 1967).

The depth at which this species was collected is apparently the greatest from which an Antarctic psolid has been taken; most psolids occur in depths of less than 1000 meters, but four species of *Psolidium* have been recorded from depths in excess of 2000 meters in other areas.

#### LITERATURE CITED

- PAWSON, D. L. 1967. The psolid holothurian genus *Lissothuria*. Proc. U.S. Nat. Mus. 122: 1–17, figs. 1–5.